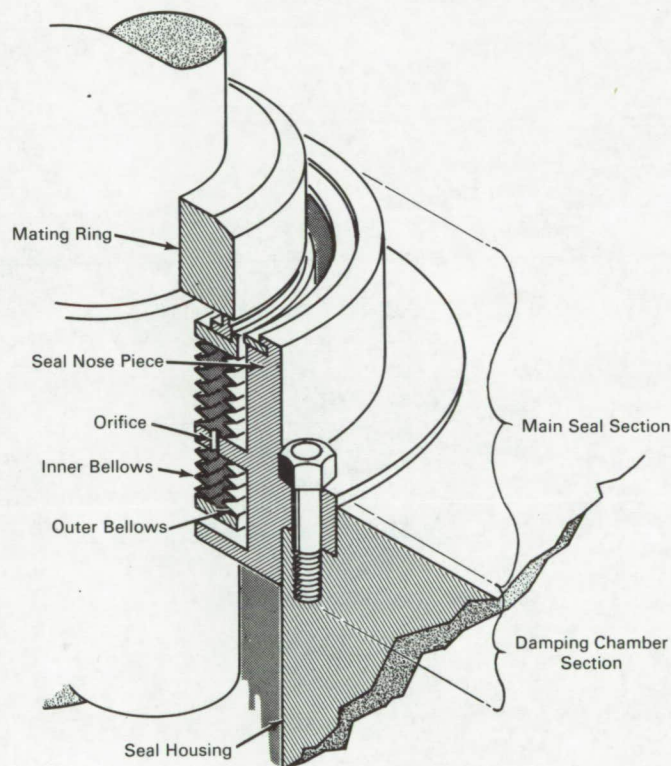


# NASA TECH BRIEF



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## Fluid Damping Reduces Bellows Seal Fatigue Failures



### The problem:

To design a bellows-type seal with long service life in the presence of mechanical vibration. Present bellows seals are subject to fatigue failure caused by vibration.

### The solution:

A system of interconnected bellows in which the intervening cavities are filled with a fluid that reduces the amplitude of periodic deflection of the sealing bellows.

### How it's done:

The system consists of four metal bellows, each pair having a cavity filled with the damping fluid. The bellows pairs, consisting of a main bellows pair and damping bellows pair, are interconnected by an orifice in a member of the main seal body to permit the fluid to flow freely between them. As the seal vibrates, the main bellows contracts and expands with it. Movement of the main bellows causes the fluid to flow back and forth through the orifice. This flow exerts a

(continued overleaf)

counterforce that reduces the amplitude of the deflection and lessens the incidence of fatigue failure.

**Notes:**

1. Different fluids may be used according to environmental conditions. For example, liquid nitrogen may be used in cryogenic applications, oil for room temperature, or liquid metals for high temperatures.
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Marshall Space Flight Center  
Huntsville, Alabama, 35812  
Reference: B66-10249

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C., 20546.

Source: North American Aviation Inc.  
under contract to  
Marshall Space Flight Center  
(M-FS-565)